

PATENT ABSTRACTS OF JAPAN

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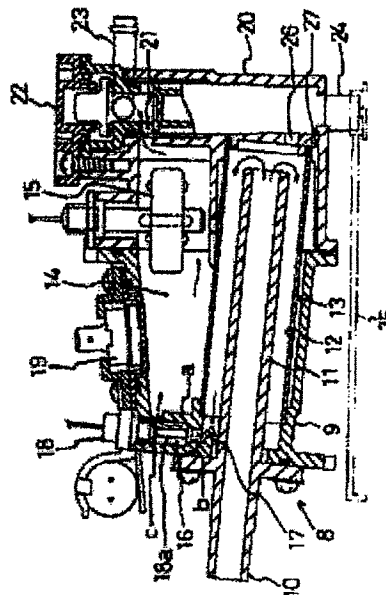
(54) HEAT EXCHANGER UNIT

(57)Abstract:

PROBLEM TO BE SOLVED: To efficiently conduct current application to a heater in a heat exchanger unit provided to a sanitary washing device.

SOLUTION: A device comprises a remote controller in which there is an operation button indicated 'wash'.

When the button is pressed, washing water (cold water) from a water supply source flows into a heat exchanger 8 through a water supply pipe 10. Concurrently with the flowing in of the washing water to the heat exchanger 8, a heater 11 starts full current application. The washing water which flows between the outer peripheral surface of the heater 11 and a heating tank 13, is heated to a given temperature by the current application to the heater 11. The hot water produced in this way is supplied to a nozzle device from a hot water storage portion 14.



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CLAIMS

[Claim(s)]

[Claim 1]While a heater which is formed in a sanitary cleaning device which spouts warm water

from a nozzle with predetermined washing directions, and heats this water by energization, and this heater are allocated, Have the heat chamber in which an entrance and an exit of said water were established, and water which flows toward said exit from said entrance is heated with said heater, Are a heat exchange apparatus which flows out of said exit into said nozzle direction warm water generated by this heating, have a control means which controls an energization condition of said heater, and this control means, A heat exchange apparatus which is a means to control to start full energization when said predetermined washing directions are made in an energization condition of said heater.

[Claim 2]The heat exchange apparatus according to claim 1 which is a means to control said control means in the state where warm water which stagnated an energization condition of said heater in said heat chamber can be kept warm when said predetermined washing directions are not made.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to the sanitary cleaning device which turns to a part what heated wash water to prescribed temperature momentarily, and was used as usable warm water, and injects it, and relates to improvement of a heating type heat exchange apparatus at the moment of enabling it to detect the temperature of said heated warm water correctly.

[0002]

[Description of the Prior Art]The general thing of the sanitary cleaning device for local washing is the structure which enabled it to use for a toilet body for this casing, building warm water heating apparatus, a nozzle device, etc. into the inside of a casing, and fixing.

The example is shown in drawing 7.

In drawing 7, the toilet seat 52 and the toilet lid 53 are attached to the casing 51 attached to the back part of the toilet bowl 50 upper surface, enabling free opening and closing, and the nozzle 54 which goes under the bottom of the toilet seat 52, and moves is prepared for said casing 51.

And between the service pipes 55 connected with said nozzle 54 at the rear of the casing 51.

Outline composition of the sanitary cleaning device 58 is carried out by carrying out the pipe connection of the electromagnetic valve 56 having a pressure regulating valve, and the heat exchanger 57 of a heating type at the moment of storing a heater and a temperature sensor in a tubed case, and installing the heat exchanger 57 of the heating type at this moment in the casing 51.

[0003]Next, as the heat exchanger 57 of a heating type at the moment of being used for said sanitary cleaning device 58, there are some etc. which were indicated to JP,1-42757,Y, for example, and drawing 8 explains the structure. The metal heating tank 61 which formed the heat exchanger 57 shown in drawing 8 in the shape of a cylinder like object with base, Consist of the

hot-water-storing pipe 62 made of a synthetic resin formed in the shape of a hollow cylinder, and said heating tank 61 in the hot-water-storing pipe 62. It stores so that it may have the hot-water-storing part 62a in that upper part, and the open end side of said heating tank 61 is attached in one opening of the hot-water-storing pipe 62, and the heating tank 61 and the hot-water-storing pipe 62 are opened for free passage via the through hole 63 which carried out the opening to the periphery by the side of the open end of this heating tank 61. After continuing, making it open for free passage with the feed water line which does not illustrate the heater 64 of the shape of a hollow cylinder which printed and formed the heating element in the surface and fitting in loosely in said heating tank 61. Close one opening of said hot-water-storing pipe 62 in the flange of the heater 64, and the opening of another side of this hot-water-storing pipe 62. It is constituted by being closed down using the box 68 of the safeguard 67 possessing the float switch 65 and the vacuum switch 66 in the state where this box 68 and the hot-water-storing pipe 62 were made to open for free passage.

[0004] And generation of the warm water used for local washing is faced. If this wash water will flow into the heater 64 → heating tank 61 → hot-water-storing pipe 62 if it lets wash water flow to the heat exchanger 57, and the inside of this hot-water-storing pipe 62 reaches a predetermined water level. The wash water which the float switch 65 operates, carries out full energization of the heater 64, and flows between the peripheral face of this heater 64, and the heating tank 61. Heated to a predetermined temperature set up with the control device which is not illustrated, fed the nozzle 54 with this through the box 68 → hot water pipe 69 of the hot-water-storing pipe 62 → safeguard 67, it was made to blow off from the nozzle 54, and local washing is presented. In advance of feed water of wash water, the wash water of most which is stagnating in the hot-water-storing pipe 62 and the heating tank 61 is kept warm by optimal temperature with the heater 64.

[0005]

[Problem to be solved by the invention] being appropriate — it being alike and in the heat exchanger 57 of said structure, As shown in drawing 8, above the through hole 63 which carried out the opening to the heating tank 61. The temperature sensor 70 which detects the temperature of the warm water heated with the heater 64 is attached. Detection temperature becomes high to preset temperature, or the temperature of the warm water generated by energization of said heater 64 is detected, the detecting signal is always sent out to a control device, when low, energization control of the heater 64 is carried out by the instructions from a control device, and warm water is always maintained to preset temperature. And the optimal temperature water which will stagnate in the heat exchanger 57 by this if wash water (chilled water) flows into the heat exchanger 57 on the occasion of local washing. While extruding from the heat exchanger 57 then and spouting from the nozzle 54, with the heater 64 in which energization control is carried out by the instructions from a control device, the wash water to which water was newly supplied is heated by optimal temperature, and is spouted from the nozzle 54.

[0006] In this case, namely, in the position of through hole 63 directly under of the heating tank 61. When wash water with receiving [little] the heating operation of the heater 64 is stagnating at the temperature below preset temperature and this low-temperature hot water contacts the through hole 63 side with the Oshige **** temperature sensor 70 with feed water of said wash water, the temperature sensor 70 will detect the water temperature of low-temperature hot water. As a result, since said detection temperature is fairly lower than preset temperature, the heater 64 continues full energization by the instructions from a control device, and although optimal temperature water was blowing off from the nozzle 54 until now, the warm water of a temperature higher than preset temperature will spout it rapidly. And if the warm water whose temperature is higher than preset temperature spouts, this will be detected, the instructions which stop the energization to the heater 64 will be sent out from a control device, and the temperature sensor 70 will once stop the energization to the heater 64. Then, the warm water below preset temperature spouts the temperature sensor 70 from the nozzle 54 conversely until full energization of the heater 64 is carried out, although the instructions which detect this and energize the heater 64 will be sent out from a control device, if a water temperature descends

below to preset temperature.

[0007] Thus, on the relation as which the system to which the temperature of the wash water spouted from the nozzle 54 carries out energization control of the heater 64 with the temperature sensor 70 is adopted, From the nozzle 54, except for the water flow early stages of wash water, exceed preset temperature or. Or the warm water actually spouted although the user set up his favorite hot water temperature, since the warm water of the temperature than which it is less blew off constantly, Since it was a thing which is unrelated in any way to preset temperature and which is hotly sensed cold, there was a possibility of giving a user embarrassment and displeasure to local washing. Since low-temperature hot water will be mixed with the warm water heated with the heater 64 in the through hole 63 neighborhood if water supply amounts are increased in order to be easy to produce the aforementioned phenomenon when the water supply amounts of wash water are little comparatively, and to solve this, the experiment shows that the fault of the detection temperature by the temperature sensor 70 is solvable, but. Since water supply amounts changed with a user's liking, it was difficult to have made the warm water of the temperature which could not become a clue to problem solving at all, and the user set up now blow off certainly only by changing these water supply amounts.

[0008] If an example is taken by the aforementioned various problems, before the low-temperature hot water which is stagnating in the heating tank 61 being extruded by water flow of wash water and contacting the temperature sensor 70, it is needed to make fitness mix this low-temperature hot water with the wash water heated with the heater. If the moment heating type heat exchange apparatus of a sanitary cleaning device is improved so that such mixing may be realized, the situation where exact water temperature detection will be barred by the temperature sensor 70 is certainly cancelable by extruding low-temperature hot water. If such improvement is realized with an easy structure, economical manufacture of a heating type heat exchange apparatus is attained at the moment, and it is suitable.

[0009] The warm water generated by heating of the heater 64 is injected by the part. Therefore, it is necessary to perform energization to the heater 64 efficiently so that the warm water of the temperature near preset temperature can be obtained in the case of use.

[0010] This invention solved above-mentioned SUBJECT and took the following composition that the heat exchange apparatus which performs energization to a heater efficiently should be provided.

[0011]

[The means for solving a technical problem, and its operation and effect] While the heater which the first heat exchange apparatus of this invention is formed in the sanitary cleaning device which spouts warm water from a nozzle with predetermined washing directions, and heats this water by energization, and this heater are allocated, Have the heat chamber in which the entrance and exit of said water were established, and the water which flows toward said exit from said entrance is heated with said heater, Are a heat exchange apparatus which flows out of said exit into said nozzle direction the warm water generated by this heating, have a control means which controls the energization condition of said heater, and this control means, Let it be a summary to be a means to control to start full energization when said predetermined washing directions are made in the energization condition of said heater.

[0012] When predetermined washing directions are not made in the above-mentioned control means, it is also preferred to consider it as a means to control in the state where warm water which stagnated an energization condition of a heater in a heat chamber can be kept warm.

[0013] A heating tank which the second heat exchange apparatus is a heat exchange apparatus of a heating type at the moment, and contained a heater, Fit in loosely at rocking impossible in hot-water-storing housing which consists of a synthetic resin excellent in heat resistance and a water resisting property, and in this hot-water-storing housing, [above said heating tank], a float switch is incorporated, and this housing and a heating tank, and hot-water-storing housing and an almost cylindrical trap plug open for free passage cross at right angles, and are inserted in the side of said hot-water-storing housing in one in a lengthwise direction. A temperature sensor which detects temperature of warm water which made a temperature taking part project in housing, a bimetal switch for overheat prevention, etc. are arranged appropriately at an upper

bed of said hot-water-storing housing. In hot-water-storing housing in which a temperature taking part of said temperature sensor projects, In the lower part which punches a through hole which makes a heating tank and hot-water-storing housing open for free passage in a wall surface located in the base end side of a heater, and faces in a heating tank of this through hole. a baffle was horizontally protruded in the state where a minute of an opening cross-section area of this through hole half [about] is interrupted, and low-temperature hot water which is stagnating in the bottom of a heating tank with this baffle constituted so that it might prevent contacting a temperature taking part of a direct temperature sensor

[0014] Since a baffle which interrupts an abbreviation half of the opening cross-section area to a through hole which opens a heating tank and hot-water-storing housing of a heat exchange apparatus for free passage was formed, as mentioned above, low-temperature hot water which stagnates in a heating tank, When pushed up by water flow of wash water, in the state where it was put back in the direction of a tip of a heating tank by said baffle. In order to be mixed with wash water already heated with a heater before said through hole, to flow into a through hole and to contact a temperature taking part of a temperature sensor, Since temperature near temperature of wash water heated by heater is detectable compared with a case where low-temperature hot water carries out direct contact to a temperature taking part of a temperature sensor, a problem that exact water temperature detection is barred with the advent of low-temperature hot water is certainly solvable.

[0015] a baffle formed in a through hole of warm water -- a minute of an opening cross-section area of this through hole half [about] -- a wrap, although formed in the state [like], Wash water which this is for low-temperature hot water which is stagnating in a heating tank to prevent being pushed up in the direction of a through hole almost vertically, and was heated with a heater, since the most will flow along shaft orientations of a heating tank -- said baffle -- an opening of a through hole -- a minute wrap half [about] -- even if formed like, when circulation directions of heated wash water differ, in a heat exchange apparatus, wash water can be circulated smoothly and good.

[0016] Since a means to interfere with low-temperature hot water which is stagnating in a heating tank rising in the lower part of a through hole in which a temperature taking part of a temperature sensor in a heat exchange apparatus is inserted in right above, and contacting it with a temperature taking part of said temperature sensor is formed as explained above, Exact temperature detection of a temperature sensor is attained without completely being influenced by said low-temperature hot water. For this reason, the user of warm water can get warm water of temperature which oneself set up good not related with existence of said low-temperature hot water.

[0017] When low-temperature hot water which is stagnating in a heating tank is made the through hole side with wash water which flows in a heat exchange apparatus, Since it shows around at the warm water side heated with a heater and mixes with this warm water to fitness with a baffle formed in said through hole bottom, while an adverse effect to a temperature sensor is cancelable, Although a baffle formed in the through hole bottom prevents circulation to a through hole of low-temperature hot water, since it can circulate smoothly warm water heated with a heater, There is nothing that bars circulation of warm water by existence of said baffle, and warm water which heated wash water can be spouted as optimal temperature water from a nozzle device good.

[0018]

[Mode for carrying out the invention] Hereafter, drawing 1 thru/or drawing 6 explain an embodiment of this invention. Drawing 1 shows the state where a sanitary cleaning device provided with a moment heating type heat exchanger (henceforth a heat exchanger) of this invention was installed on a toilet body, in a figure, using the upper surface by the side of regions of back of the toilet body 1, carries the sanitary cleaning device 2 and is fixed. The sanitary cleaning device 2 forms a building envelope, fixes the base 3b to the toilet body 1, and is installed by the base 3b with plane shape shown in the upper casing 3a and drawing 3. And the toilet seat 4 and the toilet lid 5 are attached to the upper casing 3a like drawing 2, enabling respectively free opening and closing. A function part of the sanitary cleaning device 2 shall be

operated using a remote controller (not shown) hung on a wall, and forms only the auxiliary control board 3c which made **** smaller than the conventional thing markedly in a flank of the upper casing 3a.

[0019]As drawing 3 shows, the nozzle device 6 is mostly arranged in the center, and the pipe line which supplies the wash water of the base 3b heated to this nozzle device 6 is provided in the inside of the sanitary cleaning device 2. The nozzle device 6 is the thing provided with the nozzle which carries out reciprocation operation of between stowed positions by a motor, and should just incorporate as it is what is used from the former. The heat exchanger 8 which heats the valve unit 7 linked to an external wash water charging line and the wash water to which water was supplied in the supply system of the wash water to the nozzle device 6 is formed in this order. The valve unit 7 is provided with the opening and closing valve 7a of the electromagnetic valve type which opens and closes a channel, the flow control valve 7b for adjusting the vigor of the water of the wash water spouted from the nozzle device 6, etc., and is constituted by operation of a remote controller.

[0020]Next, drawing 4 is drawing of longitudinal section showing the detailed structure of the heat exchanger 8. In a figure, the heat exchanger 8 inserts the service pipe 10 into the hot-water-storing housing 9 which consists of a synthetic resin excellent in the heatproof and the water resisting property, The heater 11 made from hollow cylinder-like ceramics which lays under the outside-surface side this service pipe 10 and the electric heating unit formed in one, It has the heating tank 13 which surrounded the surroundings of it by the sleeve 12 which consists of thermally conductive good metallic materials, such as copper, and formed them, and it is in the state which made the inside channel slanting facing down, so that it went at the tip (right of drawing 4), this heating tank 13 is made with watertight construction in the hot-water-storing housing 9, and horizontal bridging and immobilization of it are done. And the blank of the heating tank 13 upper part in said hot-water-storing housing 9 is made with the hot-water-storing part 14, and the float switch 15 for empty bathtub heating prevention is built into the part in the suitable position which does not bar circulation of wash water.

[0021]It continues, and the through hole 16 is punched from the upper bed side of the housing 9 in a lengthwise direction at the bulged part a provided in hot-water-storing housing 9 wall surface, and the end face (left of drawing 4) of the heater 11 of drawing 4 is made to open the heating tank 13 and the hot-water-storing part 14 of the hot-water-storing housing 9 for free passage via this through hole 16. and in the state of interrupting the minute of the cross-section area of said opening b half [about] on the wall surface of the hot-water-storing housing 9, as shown in drawing 4 and 5, united with the wall surface of the housing 9, the baffle 17 projects to the lower opening b which faces in the heating tank 13 of said through hole 16 horizontally in the heating tank 13, and is formed in it. In the upper part located in the hot-water-storing housing 9 of said through hole 16. The opening of the hot-water-storing part 14 and the opening c open for free passage is carried out, and the temperature taking part 18a of the temperature sensor 18 attached to the upper part of the hot-water-storing housing 9 is inserted in the range which does not project in the heating tank 13 from the lower opening b into the through hole 16 which has the openings b and c in said vertical section. The inside of drawing 4 and 19 are the bimetal switches for overheat prevention attached to the upper center of the hot-water-storing housing 9.

[0022]On downstream one end of the channel which are the service pipe's 10 connection side and an opposite hand, and goes via the sleeve 12 of the heating tank 13 from the heater 11 in drawing 4. The tubed connecting block 20 which built in the trap plug which is not illustrated inserts the inside of the housing 9 in a lengthwise direction, and is inserted in one, The opening of the connection hole 21 is carried out, and the heat exchanger 8 and the nozzle device 6 are made to open for free passage via the vacuum breaker 22 and the hot water pipe 23 which were provided in the upper part of this connection hole 21 and the connecting block 20 in the upper part side which touches the hot-water-storing part 14 of this connecting block 20. The drain cylinder 24 is connected with the lower part of the connecting block 20, and switching operation of this drain cylinder 24 is performed by making it go up and down the valve which constitutes the trap plug in the connecting block 20 which is not illustrated by the control lever 25 from the

exterior. 26 and 27 show the communication hole which makes the heating tank 13, and the hot-water-storing part 14 and a trap plug open for free passage among drawing 4, and the inside of drawing 3 and 28 show drying-by-warm-air equipment, and when not making warm water blow off, it makes the inside of the heat exchanger 8, and the inside of the atmosphere for 29 to be the vacuum switch attached to the service pipe 10 side, and always open for free passage.

[0023]Next, operation of the heat exchanger 8 is explained. At the time of the non-use of the sanitary cleaning device 2, the wash water kept warm by optimal temperature in the heat exchanger 8 is stored in the hot-water-storing part 14 and the heating tank 13. Since the piping route which ties the hot water pipe 23 and the nozzle device 6 makes it have opened for free passage with the atmosphere with the vacuum breaker 22 formed on the connecting block 20, wash water does not remain. On the other hand, since the heat exchanger 8 and the hot water pipe 23 have closed the channel which connects the heat exchanger 8 and the hot water pipe 23 with the vacuum breaker 22 while wash water is not circulating, the inside of the heat exchanger 8 is not open for free passage with the atmosphere.

[0024]When making wash water blow off from the nozzle device 6 on the occasion of local washing in the aforementioned state, If the operating button described as "washing" of the remote controller is pushed, the electromagnetism opening and closing valve 7a of the valve unit 7 will be released, and wash water (chilled water) will flow in the heat exchanger 8 through the service pipe 10 from the water supply source which is not illustrated. The heater 11 starts full energization at the same time said wash water flows into the heat exchanger 8. And while flowing from the inside of the heater 11 between the outside surface of this heater 11, and the sleeve 12, wash water is heated with the heater 11 and flows into the hot-water-storing part 14. On the other hand, the wash water (warm water) currently kept warm in the heat exchanger 8 is extruded one by one from the hot-water-storing housing 9 with the wash water which flows from the service pipe 10, opens the valve of the vacuum breaker 22, and blows off from the nozzle device 6 through the hot water pipe 23.

[0025]Thus, if wash water flows in the heat exchanger 8 through the service pipe 10 on the occasion of local washing, wash water will be heated with the heater 11, will turn into warm water, and will blow off from the nozzle device 6 through the hot-water-storing part 14 -> connection hole 21 -> hot water pipe 23 one by one. And the temperature of the warm water spouted from said nozzle device 6, When there are quantity and a low difference to the temperature which the temperature sensor 18 which inserted the temperature taking part 18a detected, and detection temperature set up a priori in the through hole 16 which makes the heating tank 13 and the hot-water-storing part 14 open for free passage, The prescribed temperature which was made to carry out energization (turning on and off) control of the heater 11 by the instructions from a control device, and was set up beforehand is maintained.

[0026]within the heating tank 13 with the wash water which flows from the service pipe 10, when [appropriate] it is alike, wash water (chilled water) is heated in optimal temperature water by the heat exchanger 8 and the nozzle device 6 is being fed, When the low-temperature hot water which is stagnating without receiving the heating operation of the heater 11 not much is extruded at the through hole 16 side, said low-temperature hot water rises in right above in the direction of the through hole 16. However, since the area like an abbreviation half is interrupted by the baffle 17 which protruded horizontally in the heating tank 13, the lower opening b of the through hole 16, Said low-temperature hot water moves horizontally (tip side of the heating tank 13) along with the baffle 17, is ****(ed) with the warm water which is heated with the heater 11 by the near side of the lower opening b of said through hole 16, and circulates to the through hole 16 side, and is mixed. And said mixed wash water is extruded by the hot-water-storing part 14 through the upper opening c as it is from the lower opening b of the through hole 16. Under the present circumstances, since the wash water and most which were heated with the heater 11 are mixed, said low-temperature hot water this mixed warm water, Since the detection temperature is performed by not low-temperature hot water but the warm water which performed mixing although temperature detection is performed in the temperature taking part 18a of the temperature sensor 18 when passing through the inside of the through hole 16, said detection temperature becomes possible [detecting the temperature near preset temperature].

[0027]Thus, become possible [the temperature sensor 18] to detect the temperature of the warm water always heated with the heater 11 by the inflow of wash water, and even if the low-temperature hot water which is stagnating in the heating tank 13 appears in the temperature sensor 18 neighborhood suddenly, In order to mix the warm water and fitness which it was obstructed that this low-temperature hot water flows in the through hole 16 directly with the baffle 17, and were heated with the heater 11 and to circulate the inside of the through hole 16. Temperature detection of the warm water by the temperature sensor 18 becomes possible [always carrying out correctly], and jet of the warm water of the temperature which the user set up himself can perform comfortably at the time of local washing.

[0028]Next, the place which measured experimentally the temperature of the warm water spouted from the nozzle device 6 using the heat exchanger 8 provided with said baffle 17, and the heat exchanger which does not have the baffle 17, The warm water in which the heat exchanger 8 of this invention which has the baffle 17 regardless of the water supply amounts of wash water maintained preset temperature (about 38 **) blows off constantly. However, in the heat exchanger which does not have the baffle 17. If jetting volume of warm water is made into the maximum with a pressure regulating valve when the water supply amounts of wash water are made abundant namely, Even if the warm water where a considerable difference is in a lower temperature gradient moreover blew off and it set up jet temperature beforehand focusing on preset temperature as the jetting volume of the thing which can make the warm water of the temperature near preset temperature blow off was reduced, it was difficult to have made the warm water of the set-up temperature blow off.

[0029]This is considered to be exactly because it to be unable to carry out by a heating operation of wash water with a heater following in footsteps of temperature detection by a temperature sensor even if it performs energization control of a heater, whenever a temperature sensor detects temperature of low-temperature hot water and high temperature hot water in which a problem is in the use on the occasion of local washing. On the other hand, when this invention forms the baffle 17 which regulates a flow of low-temperature hot water, said low-temperature hot water interrupts contact with the temperature sensor 18 with the baffle 17, mixes it with warm water heated with the heater 11 in this side and low-temperature hot water disappears, It is exactly that a problem used as hindrance of exact water temperature detection by the temperature sensor 18 was solved.

[0030]Other embodiments are shown in drawing 6. It allocates in the state where drawing 6 maintained a suitable interval at the overall length for the current plate 171 as ** at a periphery of the heater 164 which fitted in loosely in the heating tank 161, and it was crooked spirally. By making wash water which carries out conduction of the wash water which flowed in the heater 164 spirally between the heater 164 and inner skin of the heating tank 161, and lengthens contact time with the heater 164, and stagnates in the heating tank 161 produce a convection, Section composition of the heat exchanger 157a constituted so that heat exchange effectiveness might be raised and a partial temperature gradient of wash water might be reduced is shown. Temperature of warm water which passed the through hole 163 is detected by the temperature sensor 70.

[0031]Since conduction can be carried out in structure of said heat exchanger 157a, making it circle in wash water with the current plate 171 in the heating tank 161, Wash water which stagnates in the heating tank 161 decreases, and, thereby, the temperature of warm water which passes the through hole 163 can detect almost certainly a water temperature heated with the heater 164.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1]It is a perspective view of the sanitary cleaning device provided with the moment heating type heat exchange apparatus of this invention.

[Drawing 2]It is a perspective view of the sanitary cleaning device in which a state when a toilet lid is opened is similarly shown.

[Drawing 3]It is a top view showing the internal structure of the sanitary cleaning device provided with the heat exchange apparatus of this invention.

[Drawing 4]It is drawing of longitudinal section showing the heat exchange apparatus of this invention.

[Drawing 5]It is a sectional view expanding and showing the important section of the heat exchanger of this invention.

[Drawing 6]It is drawing of longitudinal section showing other embodiments of a heat exchanger.

[Drawing 7]It is a schematic view showing the busy condition of the sanitary cleaning device using the conventional heat exchanger.

[Drawing 8]It is a sectional view traveling through and showing the conventional heat exchanger.

[Explanations of letters or numerals]

- 1 --- Toilet body
- 2 --- Sanitary cleaning device
- 3a --- Upper casing
- 3b --- Base
- 4 --- Toilet seat
- 6 --- Nozzle device
- 7 --- Valve unit
- 8 --- Heat exchanger
- 9 --- Hot-water-storing housing
- 10 --- Service pipe
- 11 --- Heater
- 13 --- Heating tank
- 14 --- Hot-water-storing part
- 16 --- Through hole
- 17 --- Baffle
- 18 --- Temperature sensor
- 18a --- Temperature taking part
- 157a --- Heat exchanger
- 161 --- Heating tank
- 163 --- Through hole
- 164 --- Heater
- 170 --- Temperature sensor
- 171 --- Current plate

[Translation done.]

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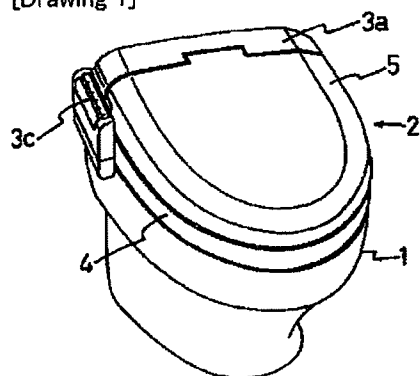
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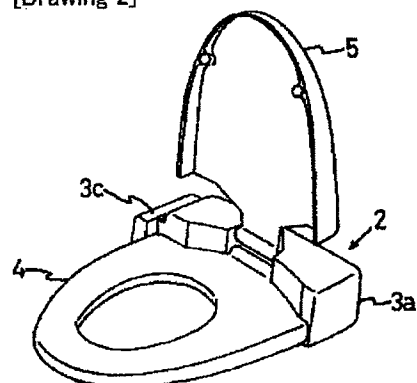
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DRAWINGS

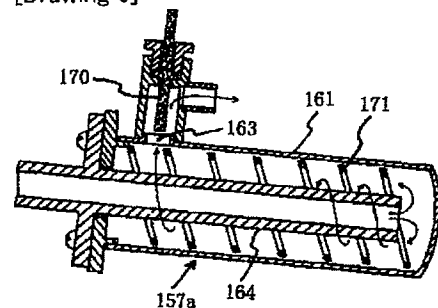
[Drawing 1]



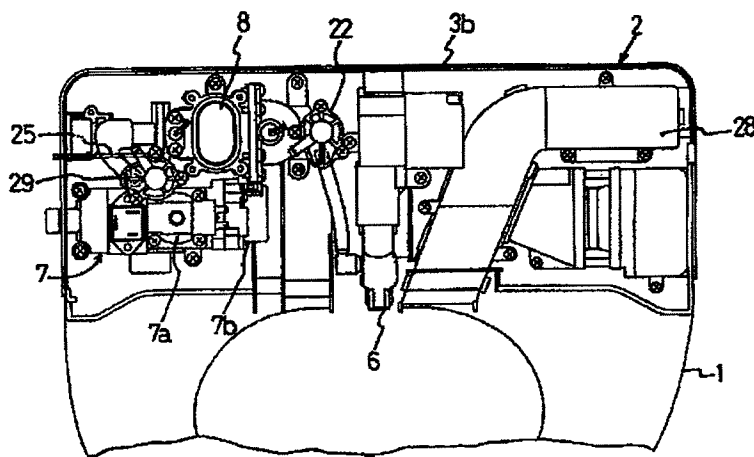
[Drawing 2]



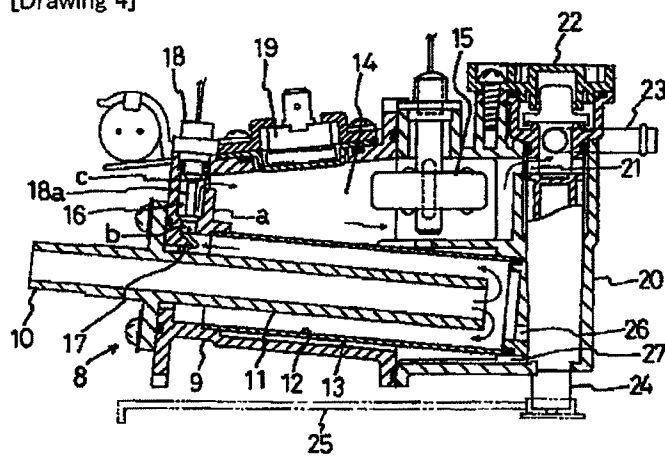
[Drawing 6]



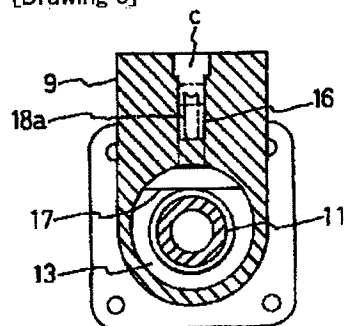
[Drawing 3]



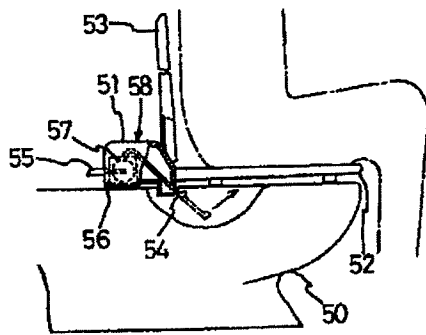
[Drawing 4]



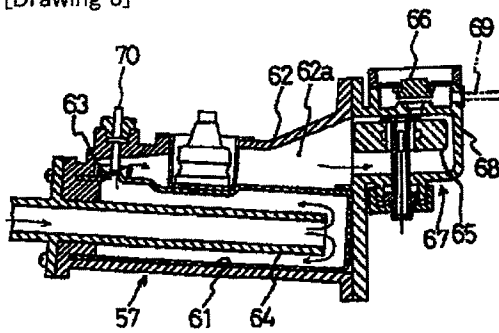
[Drawing 5]



[Drawing 7]



[Drawing 8]



[Translation done.]